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15 December 1987

MEMORANDUM FOR: Distribution

SUBJECT: ~~X~~ Inter-Agency Meeting

TYPE OF MEETING

Economic Policy Council

DATE

Thursday, 17 December 1987

TIME

1100

PLACE

Roosevelt Room

CHAired BY

Baker

ATTENDEE(S) (probable)

NIO/Econ

SUBJECT/AGENDA

Space Commercialization

PAPERS EXPECTED

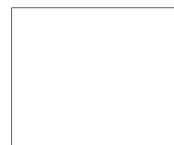
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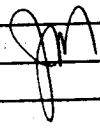
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Deane Hoffman~~SECRET~~

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Remarks

Executive Secretary

14 Dec 87

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THE WHITE HOUSE

WASHINGTON

December 16, 1987

MEMORANDUM FOR THE ECONOMIC POLICY COUNCIL

FROM:

EUGENE J. McALLISTER *EM*

SUBJECT:

Agenda and Paper for the December 17 Meeting

The agenda and paper for the December 17 meeting of the Economic Policy Council are attached. The meeting is scheduled for 11:00 a.m. in the Roosevelt Room.

The single agenda item will be a report from the Working Group on Space Commercialization. The Working Group has prepared for the Council's consideration a number of proposals for advancing commercial space efforts. A paper from the Working Group is attached.

Attachment



ECONOMIC POLICY COUNCIL

December 17, 1987

11:00 a.m.

Roosevelt Room

AGENDA

1. Report from the Working Group on Space Commercialization

December 16, 1987

COMMERCIAL SPACE INITIATIVE

A quarter of a century ago, U.S. technological leadership in landing a man on the moon and returning him safely to Earth pushed back the frontier of space, providing opportunities for new scientific discoveries and a myriad of commercial activities in Earth's orbits and potentially on the lunar surface as well.

The Administration remains committed to pushing back farther the frontier of space through continued exploration of the solar system. The technology development necessary for future missions will contribute importantly, as it has done in the past, to the U.S. commercial sector's competitiveness in space activities. However, vigorous commercialization of space -- as well as U.S. leadership in space overall -- ultimately will depend upon the United States' ability to assure reliable, low cost, and continual access to space and reduce the cost of space systems and infrastructure. These aims can be accomplished through traditional belief and reliance on the vitality and productivity of the U.S. private sector. In effect, the free enterprise system must be expanded to space.

The Working Group on Space Commercialization has developed an initiative for the Council's consideration. This initiative has three components:

- o Building a Solid Talent and Technology Base
- o Assuring a Highway to Space
- o Promoting a Strong Commercial Presence in Space

I. BUILDING A SOLID TALENT AND TECHNOLOGY BASE

U.S. civil and commercial space leadership and competitiveness are highly dependent upon a sophisticated, evolutionary aerospace and space technology enterprise. This foundation will enable further exploration of the solar system and scientific discoveries and make routine commercial use of space practical.

In addition, while the national pool of talent drawn to these endeavors will inevitably depend upon market opportunities in the coming years, it is important that young people and their teachers have opportunities to become familiar with aerospace and

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space-related careers and the link between excellence in these disciplines and basic math, science, and computer skills. In this regard, it is interesting to note that the scientists, engineers, and technicians necessary to operate the Space Station are in elementary school today.

Proposal 1: The Administration will fund the Pathfinder technology development program beginning in FY 1989. (OMB currently has proposal under review in the budget process).

Project Pathfinder is a research and technology program that will enable a broad range of manned and/or unmanned missions beyond Earth's orbits. The Administration proposed initiating in the FY 1988 a predecessor to Pathfinder: the Civil Space Technology Initiative (CSTI). This initiative is intended to foster development of technologies critical to U.S. missions in the Earth's orbits.

In announcing Pathfinder, the Administration will stipulate a number of commercialization policies to apply to both the Pathfinder and CSTI programs:

- consistent with Administration policies and related statutes, federally funded contractors, universities and Federal labs will own the rights to any patents and technical data including copyrights resulting from this program;
- proposed technologies and patents available for licensing will be housed in a designated Pathfinder library; and
- when contracting for commercial development of technological products, NASA will specify its requirements in a manner that provides contractors with maximum flexibility to pursue innovative and creative approaches.

Project Pathfinder will be organized around four major focuses:

A. Exploration Technology,
including U.S. capability to develop:

- (a) planetary rover;
- (b) sample acquisition, analysis and preservation;
- (c) surface power; and
- (d) optical communications.

These technologies would be important to gathering data for robotic and manned missions to the moon, Mars, or other planets.

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B. Operations Technology,
including U.S. capacity to develop:

- (a) autonomous rendezvous and docking;
- (b) resources processing pilot plant;
- (c) in-space assembly and construction;
- (d) cryogenic fluid depot; and
- (e) space nuclear power.

These technologies would augment existing U.S. capabilities, while reducing the cost of space infrastructure and operations for Earth orbit missions or the robotic and manned exploration of the Solar System.

C. Humans-in-Space Technology,
including:

- (a) extra-vehicular activity;
- (b) human performance; and
- (c) closed-loop life support.

These technologies would provide essential engineering systems to enable effective performance and good health during long-duration missions.

D. Transfer Vehicle Technology,
including:

- (a) chemical transfer propulsion;
- (b) cargo vehicle propulsion;
- (c) high-energy aerobraking;
- (d) autonomous lander systems; and
- (e) fault-tolerant systems.

These technologies would provide critical logistics capability, while reducing the cost and risk for advanced transportation systems essential for a range of missions including Earth-orbiting science and the robotic and manned exploration of the Solar System.

RESEARCH

Proposal 2: The Administration will establish a new Federal-industry-university organization affiliated with the NASA Office of Commercial Space Programs to encourage a broader range of microgravity research opportunities for Federal, university, and commercial researchers. Federal agencies represented in the organization will include NASA, NSF, NIH, NBS, and other interested agencies.

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This organization will have among its activities the following:

- a. Encouraging and facilitating Government leases of commercial vehicles and facilities, e.g. Spacehab and ISF, with microgravity environments;
- b. Developing a central mechanism to facilitate Federal, university, and commercial researchers' access to commercial R&D services, including payload design consulting and launch services;
- c. Facilitating through peer review access to limited research opportunities in the Shuttle and Space Station;
- d. Examining and recommending proposals for a Federal commercial launch voucher program, enabling Federal agencies to fund broader levels of microgravity research requiring a space launch.

EDUCATION

Proposal 3: NASA will expand its two week workshop program for high school science and math teachers to include junior high and elementary teachers. This will provide competitive opportunities for teachers to visit NASA field centers and selected aerospace industrial and university facilities.

The number of teachers annually participating in this program would increase from 200 to 1,000 at an annual cost of \$1.25 million.

Proposal 4: NASA will double the fellowship program for graduate and undergraduate students pursuing space science and engineering authorized in the FY 1988 budget National Space Grant College Act from the current 300 to 600 by 1990.

Doubling the number of fellowships would increase the cost of the program from \$5.2 million per year to \$10.8 million.

NOTE: NASA has not included these new education spending proposals in its FY 1989 budget request. If the Council recommends these new proposals, NASA requests that the funding be added to its budget -- rather than absorbed in its budget.

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Proposal 5: NASA, NSF, and DoD will contribute materials and classroom experiments for coordination and distribution by the Department of Education to requesting schools for use in school development of "tech shop" programs and courses. NASA's Office of Commercial Space Programs will encourage corporate cost sharing of this program.

Proposal 6: As part of a possible Education Initiative, Federal agencies will encourage employees, including scientists, engineers, and technicians in aerospace and space related fields to take a sabbatical year to teach in any level of education in the United States under the Program.

II. ASSURING A HIGHWAY TO SPACE

The interruption in the Shuttle system has created an opportunity for a private commercial launch industry to develop. The private sector was given a big boost in August 1986 when the President directed NASA to remove certain commercial and foreign payloads from the Shuttle manifest.

The commercial expendable launch vehicle industry now includes seven companies. The Department of Transportation estimates that the U.S. commercial launch sector has committed itself to non-recurring investments of more than \$400 million in facilities and equipment and more than \$1 billion in recurring expenditures to support commercial space transportation.

Long term competitiveness of the U.S. commercial launch industry will largely depend upon the U.S. sector's ability to reduce the costs associated with space launches and the nature of foreign launch competition, e.g. Europeans, Soviet Union, China, and Japan, much of which is currently subsidized. The President has directed USTR to begin international negotiations to ensure a level international playing field in commercial launch services.

The Working Group has identified several additional steps the Administration might take to ensure the development of the private U.S. commercial launch industry:

Proposal 7: All U.S. Government agencies will procure necessary ELV launch services directly from the private sector to the fullest extent feasible. (Implementing guidance will be contained in the forthcoming NSDD.)

Proposal 8: The Administration will consult with the commercial sector on the construction of commercial launch facilities separate from facilities owned by the DoD and NASA, and the

potential use of such facilities by the Federal Government (This proposal suggests the Federal Government may either provide subsidies for constructing commercial launch facilities and/or commit to purchase launch services at these facilities.)

Proposal 9: NASA and DoT will explore the possibility of providing a one time launch voucher that can be used to purchase private sector launches by requesting owners of secondary payloads that have a current agreement for a Shuttle launch. The voucher cannot be applied to payloads requiring the unique capabilities of the man-rated Shuttle.

Proposal 10: The Administration will also take administrative actions and offer statutory proposals to address the insurance concerns of the commercial launch industry.

- A. Third-party Liability: Consistent with Administration tort policy, the Administration will propose eliminating awards to third parties for punitive and pain and suffering damages resulting from commercial launch accidents.
- B. Government Property Damage Liability: The liability of commercial launch operators for damage to Government property arising from a launch accident shall be limited to the level of insurance required by DoT pursuant to the Commercial Space Launch Act. Above this level, the Government will waive its right to recover for damage to Government property. Below this level, the Government shall waive its right to recover for damage to Government property where such damage is caused by the willful misconduct of Government employees or Government contractors.

III. PROMOTING A STRONG COMMERCIAL PRESENCE IN SPACE

Federal investment in space technology and ventures has provided over the years the foundation for several commercial space industries, including communication and remote sensing satellites, launch services, and materials processing. Although Government continues to be the primary source of funding for technology advances, increasing foreign competition and the costs of development and operation of space vehicles and facilities suggests that the key to U.S. leadership and competitiveness in space lays ultimately with the vitality and productivity of the

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private sector. This means shifting from Federal "commercialization" of space through primarily technology spin-offs to Federal encouragement of commercial development and management of space systems and infrastructure.

In addition to policies regarding space commercialization enumerated in the proposed National Security Decision Directive on National Space Policy, the Working Group on Space Commercialization has identified the following proposals:

Proposal 11: The Administration will announce a Federal commitment to the Industrial Space Facility (ISF) developed by the commercial sector. The Federal commitment will include the following:

- a. The Federal Government will commit to a minimum \$140 million lease agreement per year for five years.
- b. The Federal lease agreement will begin on the date that NASA has agreed to launch the facility, regardless of whether the launch occurs contingent upon the facility being otherwise ready for launch on that date.
- c. Within thirty days NASA will develop and forward a plan for the use of ISF facility. Pursuant to this plan, NASA and ISF will establish a mutually agreed initial launch date.

NASA will make a "best effort" to service the industrial facility (three times per year) using the Shuttle system. NASA has already agreed to defer payments for these launches until the facility generates a revenue stream or two years after the initial launches.

Proposal 12: The Administration will announce a Federal commitment to a commercially developed, owned, and managed pressurized Shuttle middeck module: Spacehab.

Spacehab modules are pressurized metal cylinders that fit in the Shuttle payload and connect to the crew compartment through the orbiter airlock. These modules take up approximately two tenths of the payload bay and increase the pressurized living and working space of orbiters by approximately 1,000 cubic feet. The area of the Shuttle where Spacehab fits is ideal for

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microgravity research. In addition, the modules can serve as additional habitation for crew and specialists. The facility is intended to be ready in mid-1991.

The Federal commitment will include the following:

- a. A "best effort" to manifest the modules on the Shuttle up to three times per year, depending upon customer demand for Spacehab.
- b. A NASA commitment to lease part or all of the Spacehab facility primarily to work off its backlog of secondary R&D payloads.

An alternative to proposals 11 and 12 is to indicate a willingness to contract with private sector space facilities and solicit proposals.

Proposal 13: NASA will make expended Shuttle external tanks available to all feasible private sector endeavors, without necessarily recovering the cost of the tanks, over the next five years, subject to national security, international obligations, and public safety restrictions. NASA will provide any necessary technical or other assistance to these endeavors on a direct cost basis. If private sector demand is sufficient, NASA may auction the external tanks.

Proposal 14: The Government will foster a more competitive environment in satellite telecommunications by: (1) ending the FCC's "balanced loading" policy which now regulates the share of AT&T's international voice traffic that must be routed through INTELSAT, regardless of the cost of alternative routing; (2) introducing and advocating reforms within INTELSAT that will make its operations consistent with a competitive facilities marketplace; and (3) encouraging other nations to increase the competitive access to international facilities from within their territories.

Proposal 15: NASA will revise its Guidelines on commercialization of the Space Station to clarify and strengthen its commitment to private sector investment in the Space Station program. To underscore this commitment, NASA would announce, through a Statement of Interest in the Commerce Business Daily early in 1988, that it is prepared to purchase commercial goods and services to the

fullest extent feasible for development, operations, and logistics support of the Space Station, where such goods and services: (1) are not already being contracted for; and (2) are part of the approved program plan. Such goods and services would be privately developed and financed, and would fall into three categories:

- services, i.e. support for operations and logistics (includes items such as waste disposal, data and communications management, engineering support services);
- space transportation for assembly and servicing, which would include options for heavy-lift launch or man-rated ELV support; and
- equipment and components not already contracted for.

[NASA has proposed the following alternative formulation for Proposal 15: "NASA will, in consultation with OMB, review and as necessary revise its Statement on commercialization of the Space Station to re-emphasize its commitment to purchasing commercially available goods & services to the fullest extent feasible. NASA will take steps to assure that the Statement receives broad distribution, including publication in the Commerce Business Daily."]

NASA's current policy "welcomes and encourages participation" in the Space Station program by the private sector. The policy only states that NASA "will entertain proposals for commercial development and operations." This policy statement is not of sufficient strength that the private sector will make the necessary investments in development of space infrastructure.

Thus, it is important that there be specific and strong guidance to NASA that privatization of some aspects of the Space Station is desirable not only for the encouragement of space commercialization, but also to help maintain a reasonable schedule for development, deployment, and operations in the face of severe fiscal constraints on the Federal budget.

The private sector would finance the development, production, and operation of its elements, with

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the Federal Government, through NASA, acting as the customer. Joint government-industry ventures could also be considered. In all cases, the commercial partner would own all rights to resulting technologies, with royalty-free use by the government for its own purposes.

Private sector proposals will be evaluated on the basis of criteria including amount of private sector investments and the degree of risk sharing.

Proposal 16: NASA will announce performance safety and schedule requirements, and provide an opportunity for a crew emergency return vehicle (CERV) to be designed, built, and operated by the commercial sector. (Note: A decision to build the CERV may be pending for some months yet.)

Further Work

The Working Group will be working over the coming months to assess the feasibility of a lunar base developed and managed by the private sector.

In addition, the forthcoming NSDD commissions a study to explore the means whereby the nation's private capital resources can be enlisted in order to support the space goals that lend substance and credibility to (continuing) United States space leadership.

INDUSTRIAL SPACE FACILITY

The Administration will announce a Federal commitment for services such as the Industrial Space Facility (ISF) developed by the commercial sector. The Federal commitment will include the following:...[see Proposal 11]

Background

The Industrial Space Facility (ISF) is a privately financed, constructed and operated space platform, proposed by Space Industries, Inc. and Westinghouse. The ISF will be launched and serviced by the shuttle and may be used as a: manufacturing facility, assembly platform, test bed, laboratory, power source or storage facility. The ISF module, when docked to the shuttle, provides a shirtsleeve work space to conduct manned research or maintenance activities. It supports automated research and processing payloads when orbiting in a free-flying mode. The ISF could be launched as early as 1991; it is currently manifested on the shuttle for 1992.

The ISF can serve as a: shuttle enhancement by extending the shuttle's on-orbit duration and providing additional power, a shirtsleeve work space and storage space; space station pathfinder by offering a test facility for systems, user equipment, logistics and operating procedures and by extending shuttle on-orbit duration during space station build-up; defense research and operations facility by accomodating special purpose equipment and providing access to open space, short-term high-power surges and secure controlled integration and operations; material sciences laboratory by supporting either manned or automated experiments and allowing on-orbit reconfiguration and servicing.

The Space Industries Partnership has already raised \$30 million for design and development work. It plans to raise an additional \$200 million in equity investment and \$475 million in debt to deliver one fully functional ISF on orbit. The Space Industries Partnership has an agreement with NASA to provide 3 shuttle flights on a deferred payment basis.

Analysis

Government-created risks represent barriers to attracting debt financing into commercial space ventures. In the case of ISF, private debt markets are unable to assume the risk of timely shuttle launches, overall shuttle performance and the commercial risk associated with insufficient user contracts. Consequently, necessary debt capital is unavailable unless the government directly or indirectly assumes responsibility for timely shuttle performance and for providing a long-term commitment to purchase services sufficient to secure commercial financing. The Space Industries Partnership will assume responsibility for timely delivery and on-orbit operations of the ISF and will assume cost overrun risks by providing basic on-orbit services at fixed rates.

Pros

- o ISF represents a dramatic privatization initiative, involving \$250 million of private capital at risk to help build the nation's space infrastructure.
- o The proposed approach (a fixed-price government service contract) is an efficient way to stimulate private investment and innovation in space. It is a fiscally responsible way to help maintain space leadership.
- o The U.S. will have a permanent, man-tended, commercial space facility in orbit in 1992--put there with private capital--which can, among other things, actively support space station development activities.
- o Successful deployment of ISF will help break the current logjam in commercial space development and encourage other large-scale entrepreneurial space ventures.
- o It is expected that a competitive market will develop as the initial contract period helps establish the commercial viability of on-orbit services. [Note: the government service contract covers only a portion of the ISF to facilitate debt financing. The remainder must be sold to commercial customers if the Partnership is to break even. The venture

will be profitable when ISF facilities are expanded to support more customers.]

Cons

- o Neither NASA nor DoD has acknowledged a requirement for a facility like ISF, but they might have uses for such a facility if it were available.**
- o A government service contract of this magnitude should be awarded competitively, even though doing so may constitute an expropriation of a privately financed development effort.**
- o The U.S. government cannot establish firm launch dates beyond 1990 at this time even for its own flights.**
- o Shuttle performance requirements for the ISF may require additional investments for shuttle improvements.**